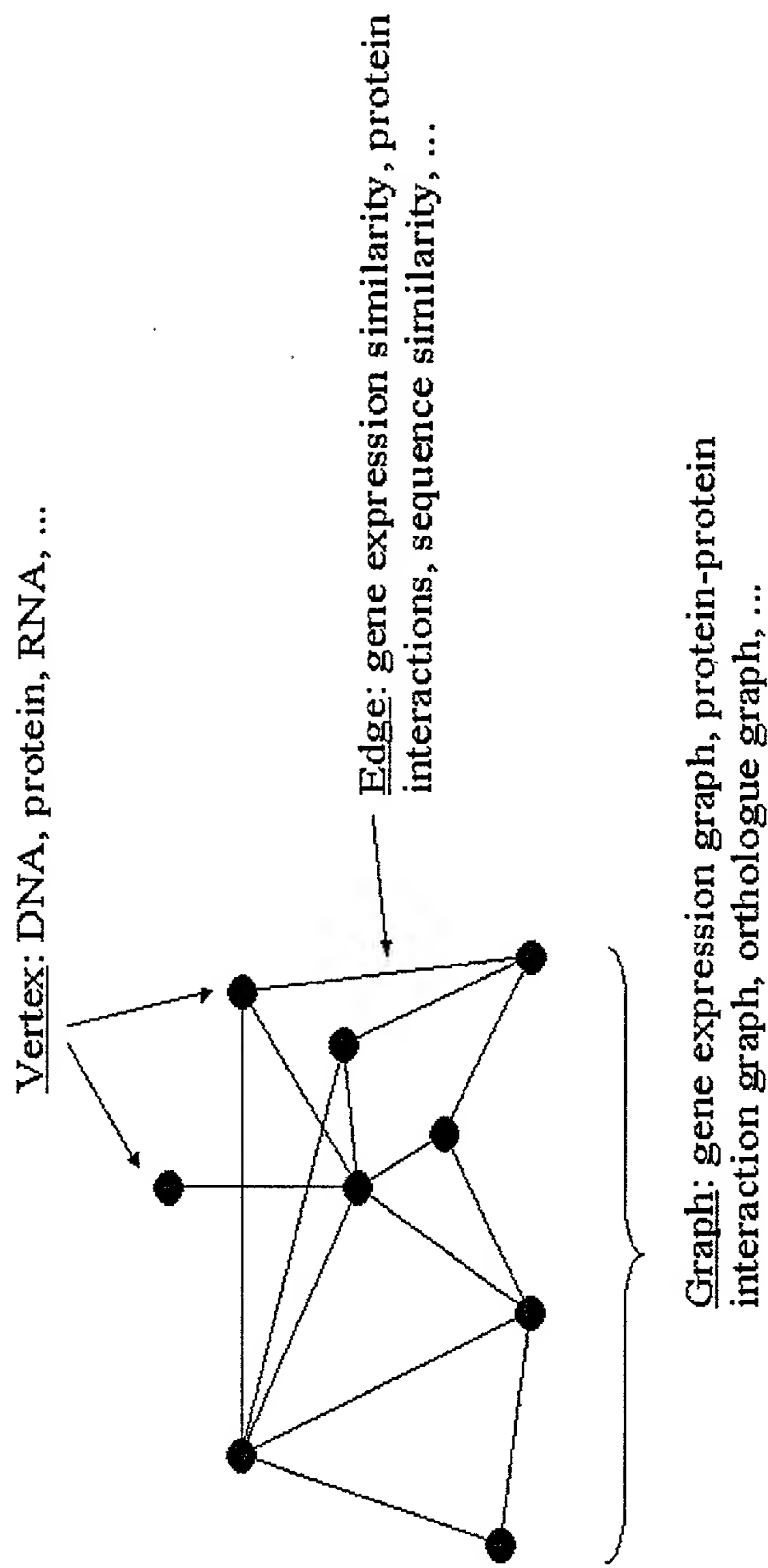


FIG. 1



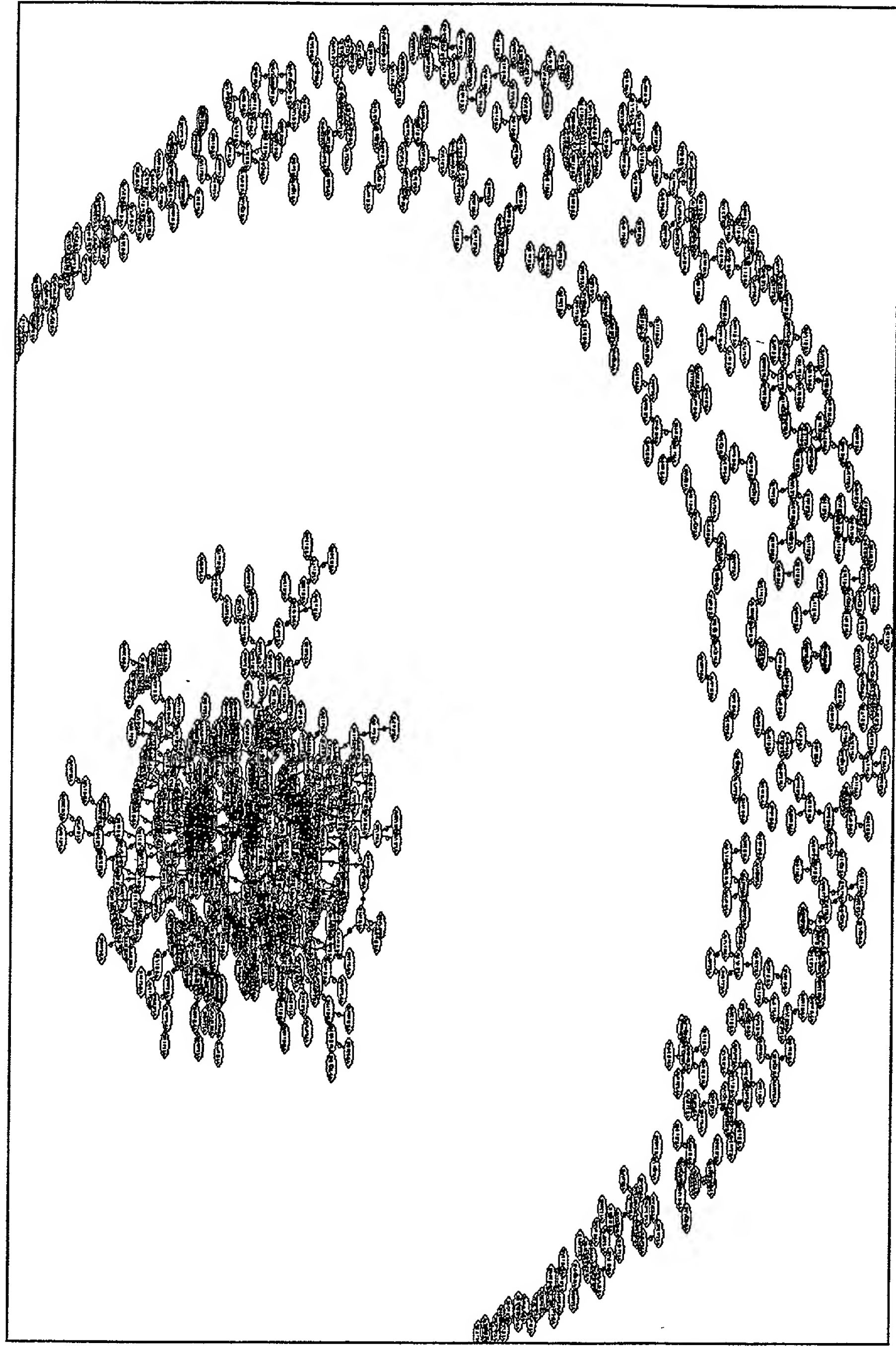


FIG. 2

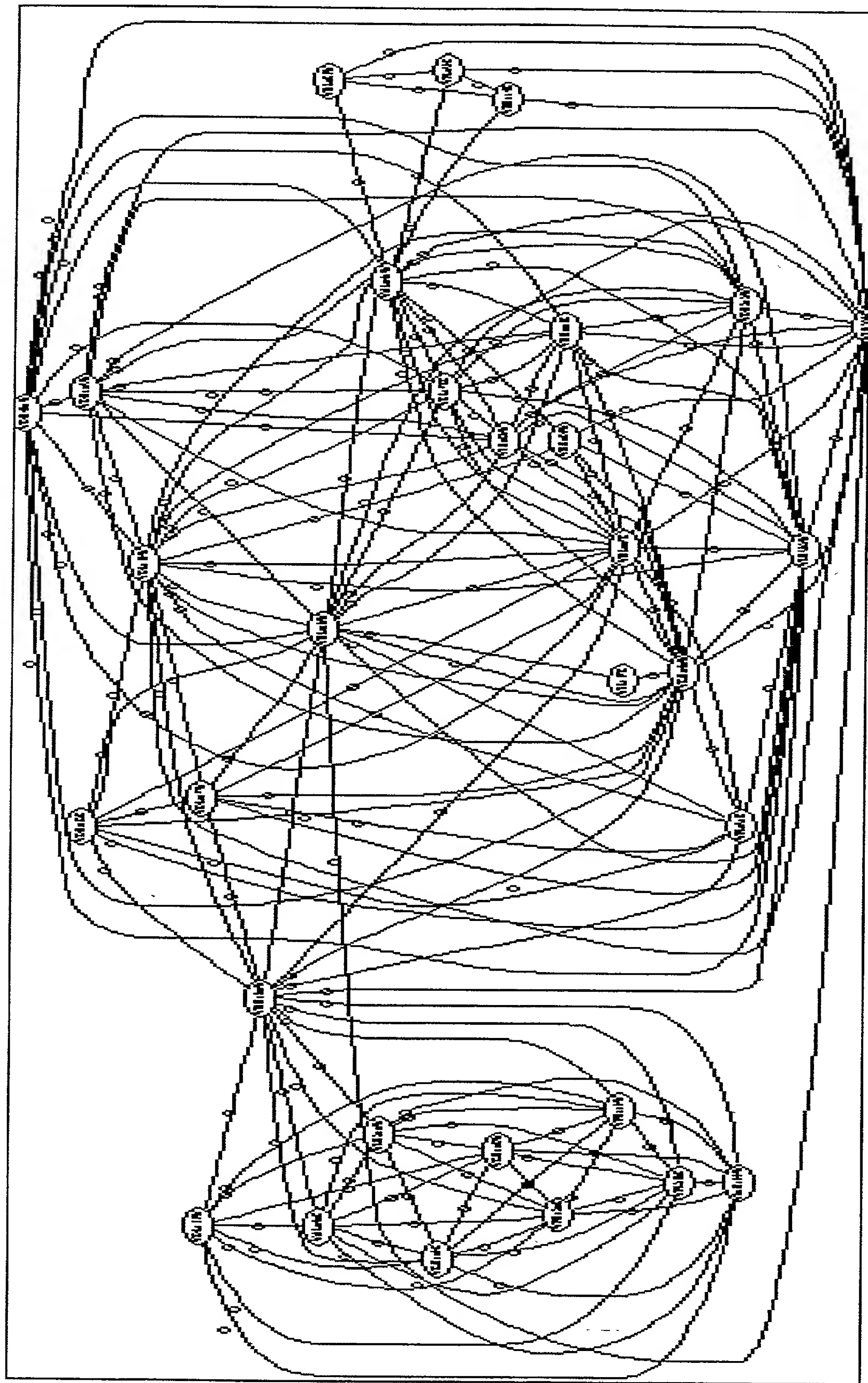


FIG. 3

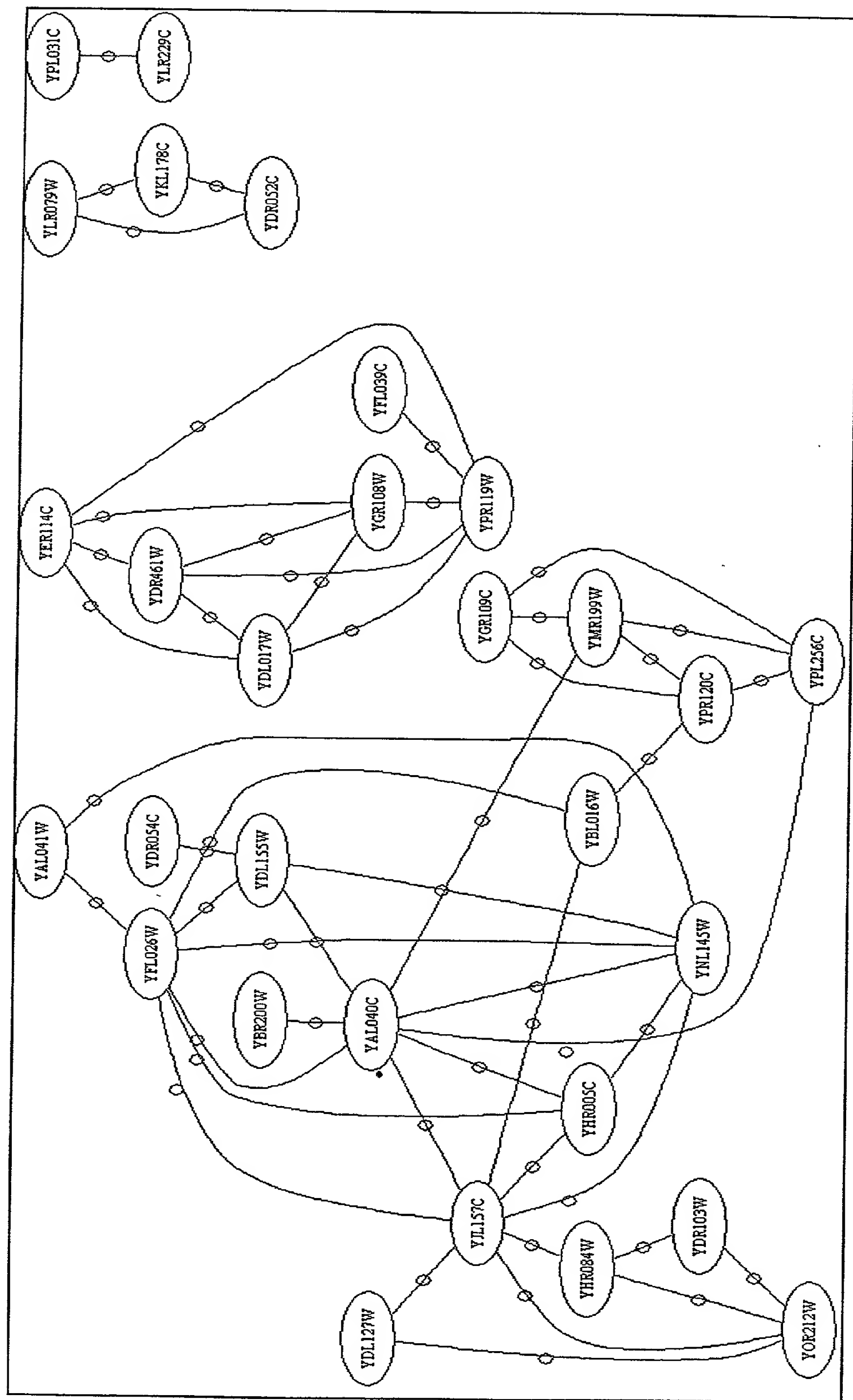
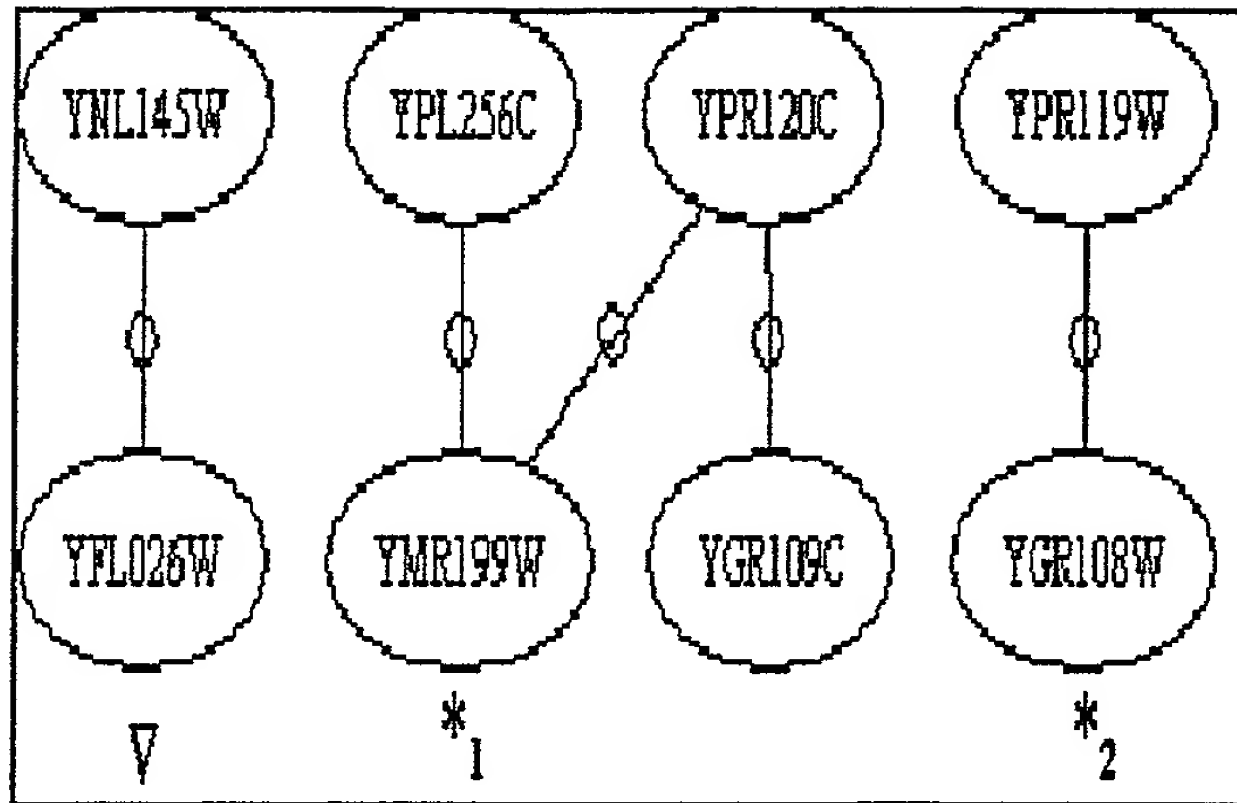
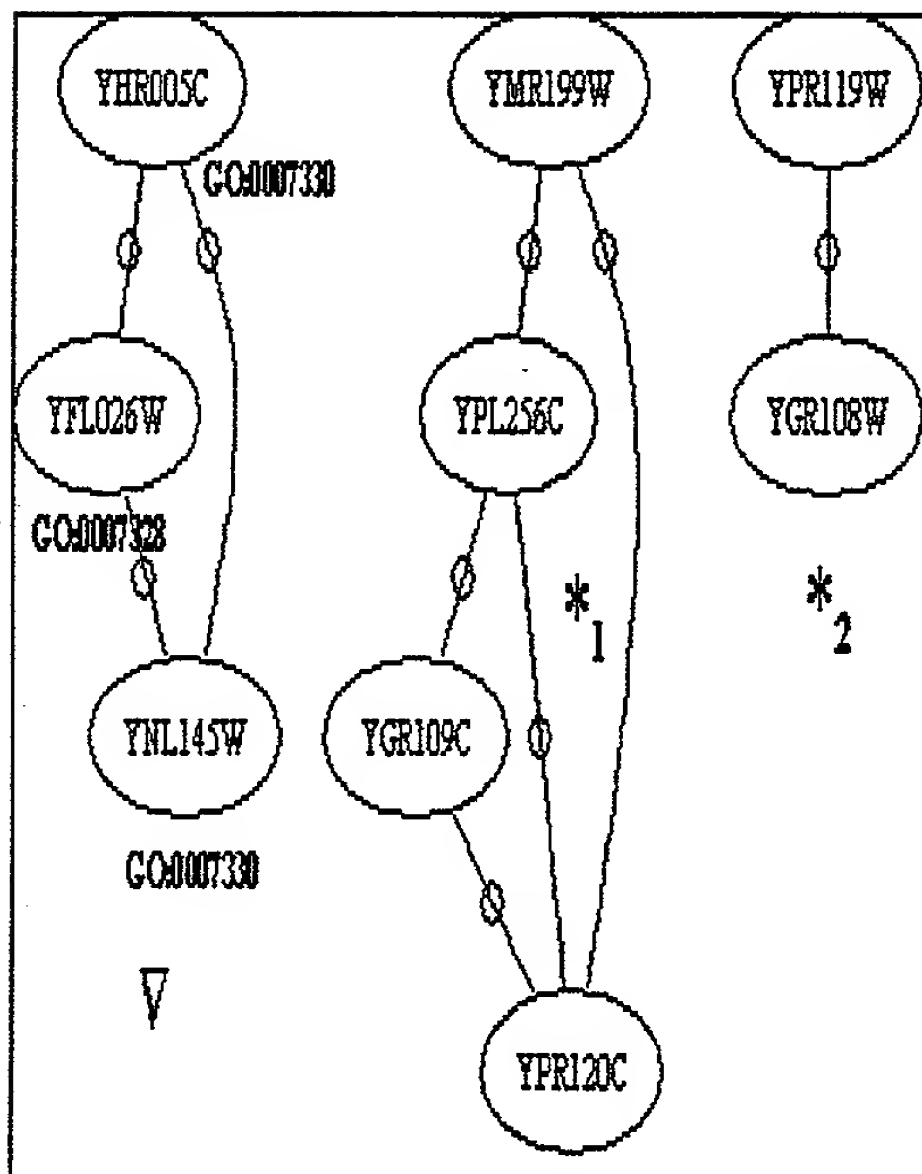


FIG. 4

B



C



E

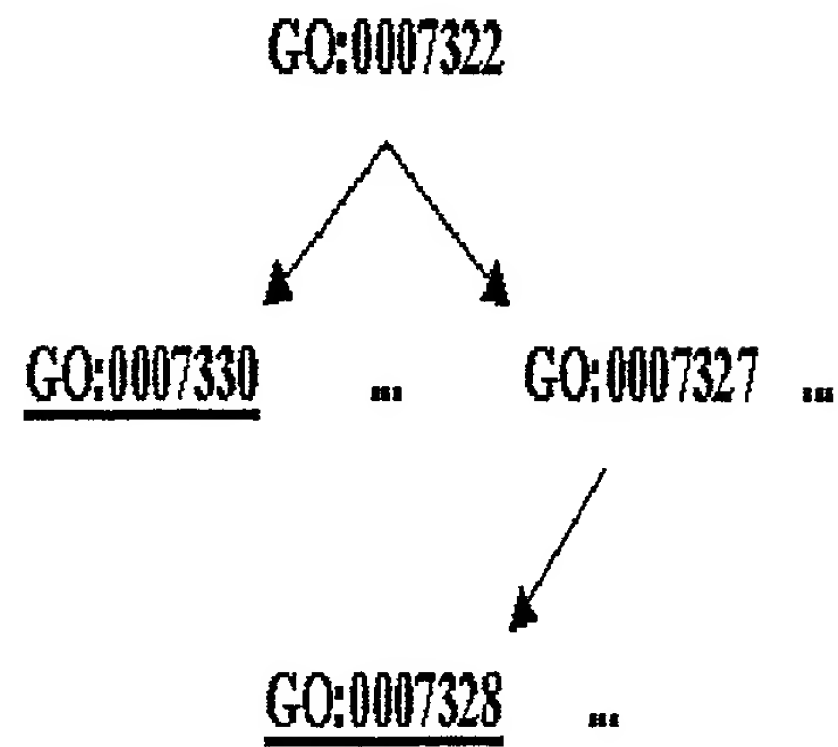


FIG. 5

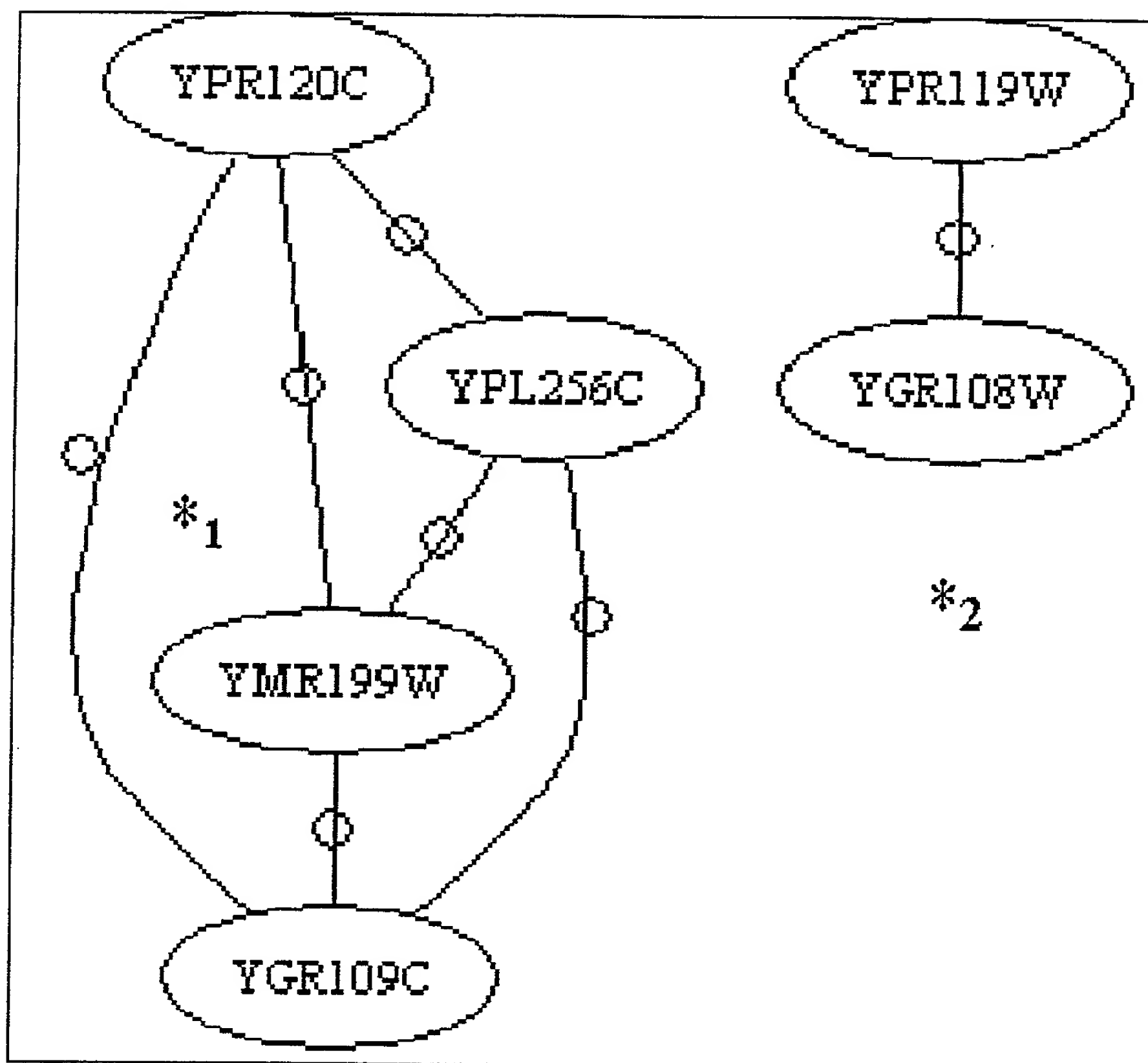


FIG. 5A

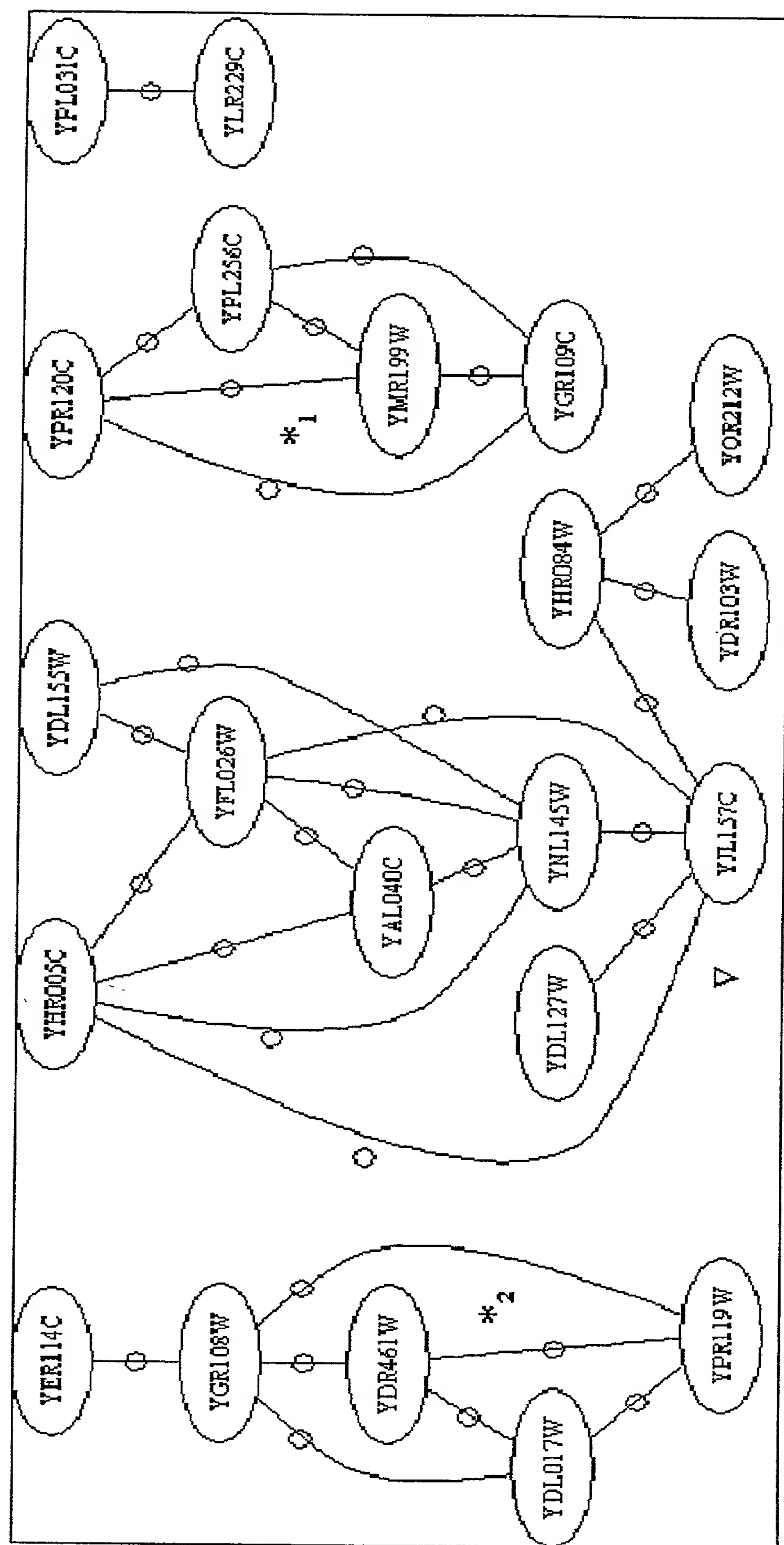


FIG. 5D

Conceptual Design of Data Mining System: An Overview

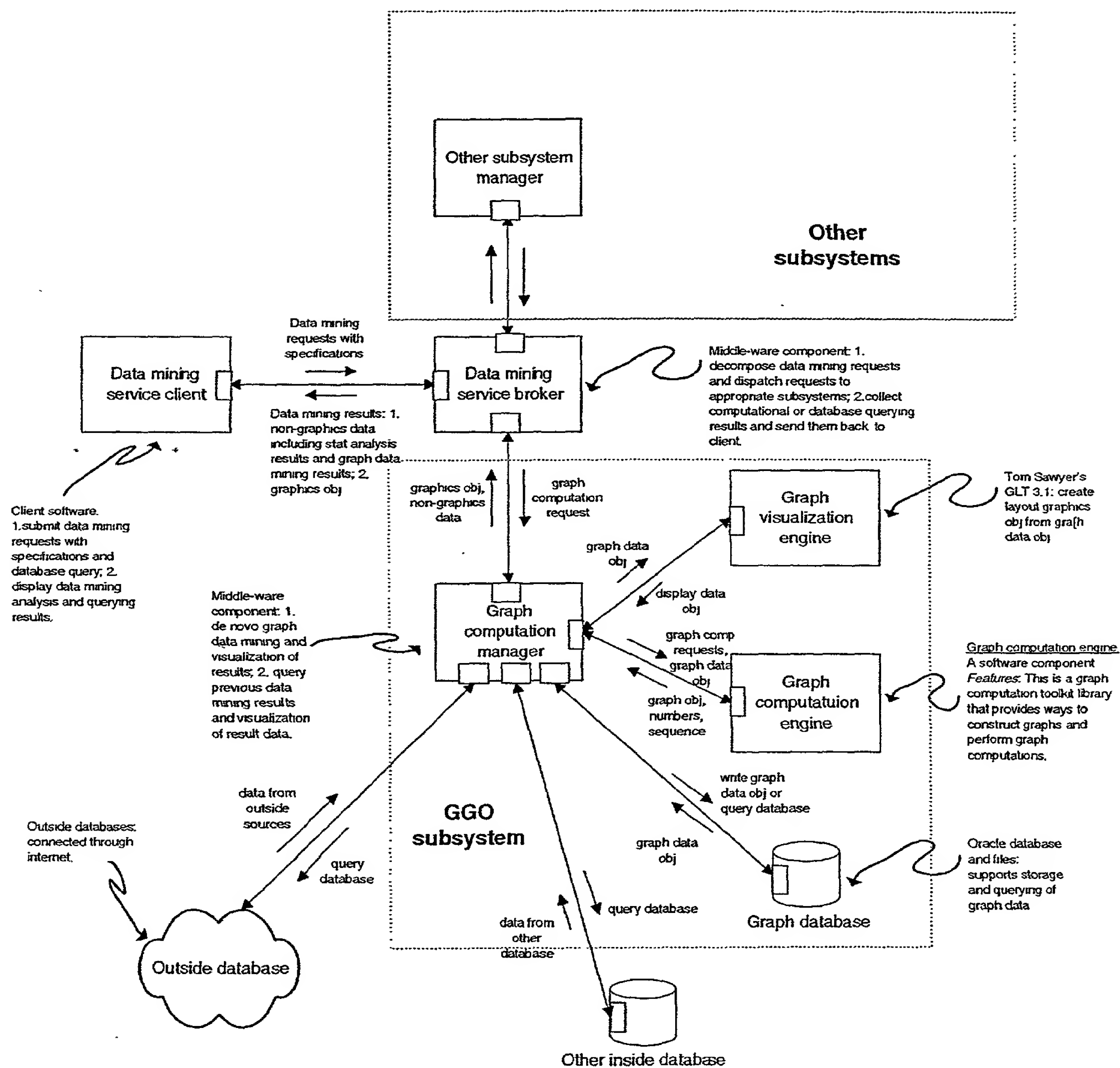


FIG. 6

Data mining service client
A software component.
Features: 1. Interacted with users to specify data mining requests; 2. submit data mining requests with specifications; 3. display data mining analysis and querying results. 4. Output data mining results for users.
Requirements: any computer.

GUI
A software component.
Features:
1. allow users to specify data mining request interactively. 2. display non-graphical data mining results; 3. construct graphics from graphical objects containing the visualization of data mining results.

Data mining request specification
A data object.
Features: 1. The type of data mining operation. 2. parameters for operation.

Request constructor:
A software component.
Features: Assemble all parameters for requested data mining operation and bundle into a request object.

Communication interface
A software component.
Features: sending requests to and receiving returned data from Data Mining Service Broker.

Data mining requests
with specifications
A data object.
Features: 1. The type of
data mining operation. 2.
parameters for operation.

Data mining result
a data object.
Features: 1. non-graphics
data including stat analysis
results and graph data
mining results; 2. graphics
object.

Communication pipeline
a network connection.
Features: 1. connecting G
with Request Constructor
and Result Dispatcher; 2.
HTTP compatible.

Data mining result
a data object
Features: 1. non-graphics
data including stat analysis
results and graph data
mining results; 2. graphics
object

Result unbundling
A software component.
Features: unbundle data mining result object.

Communication pipeline
A software component
Features:: HTTP protocol compatible.
Requirements:: network connection.

FIG. 7

Data mining service broker

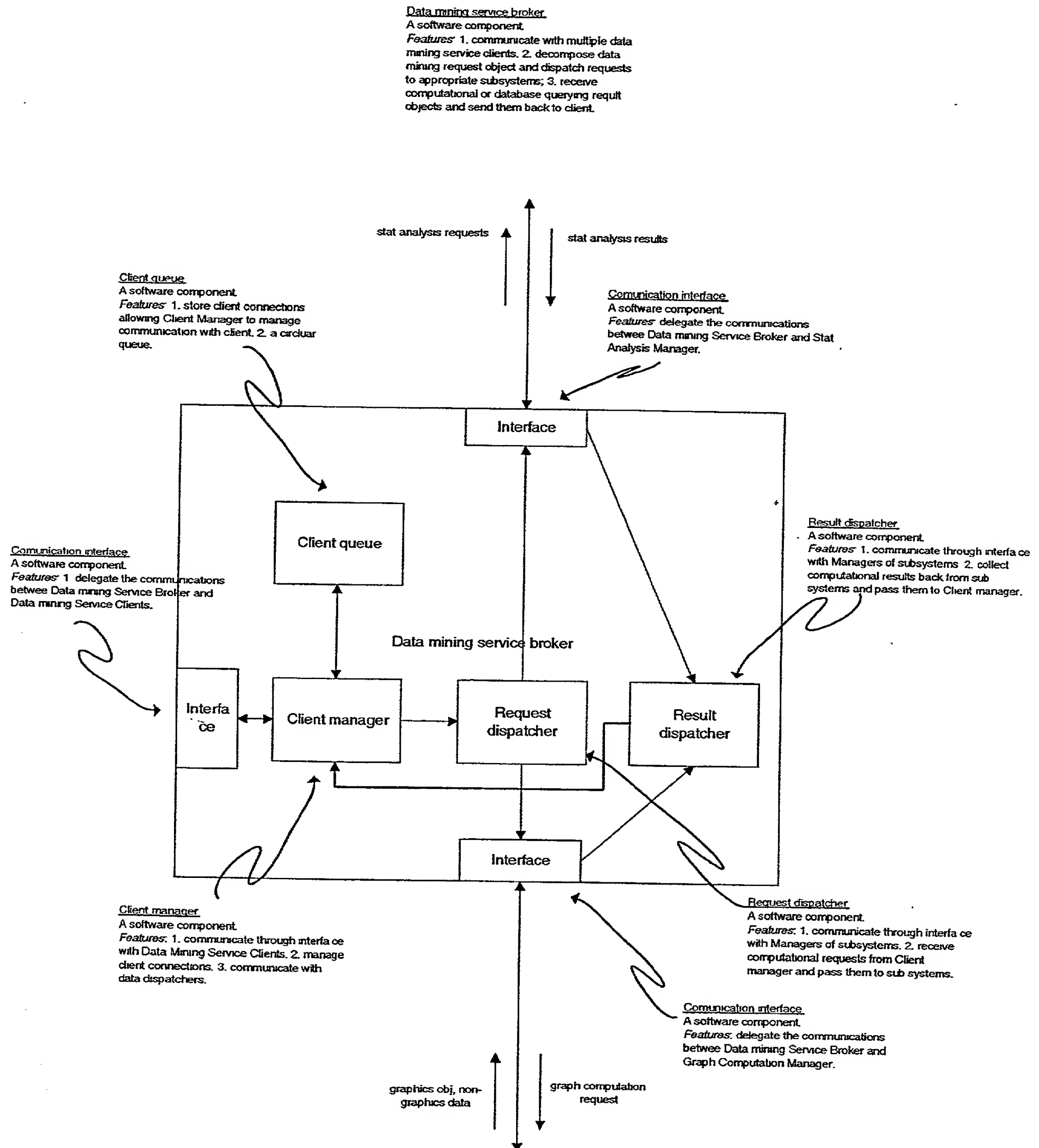


FIG. 8

Graph computation manager

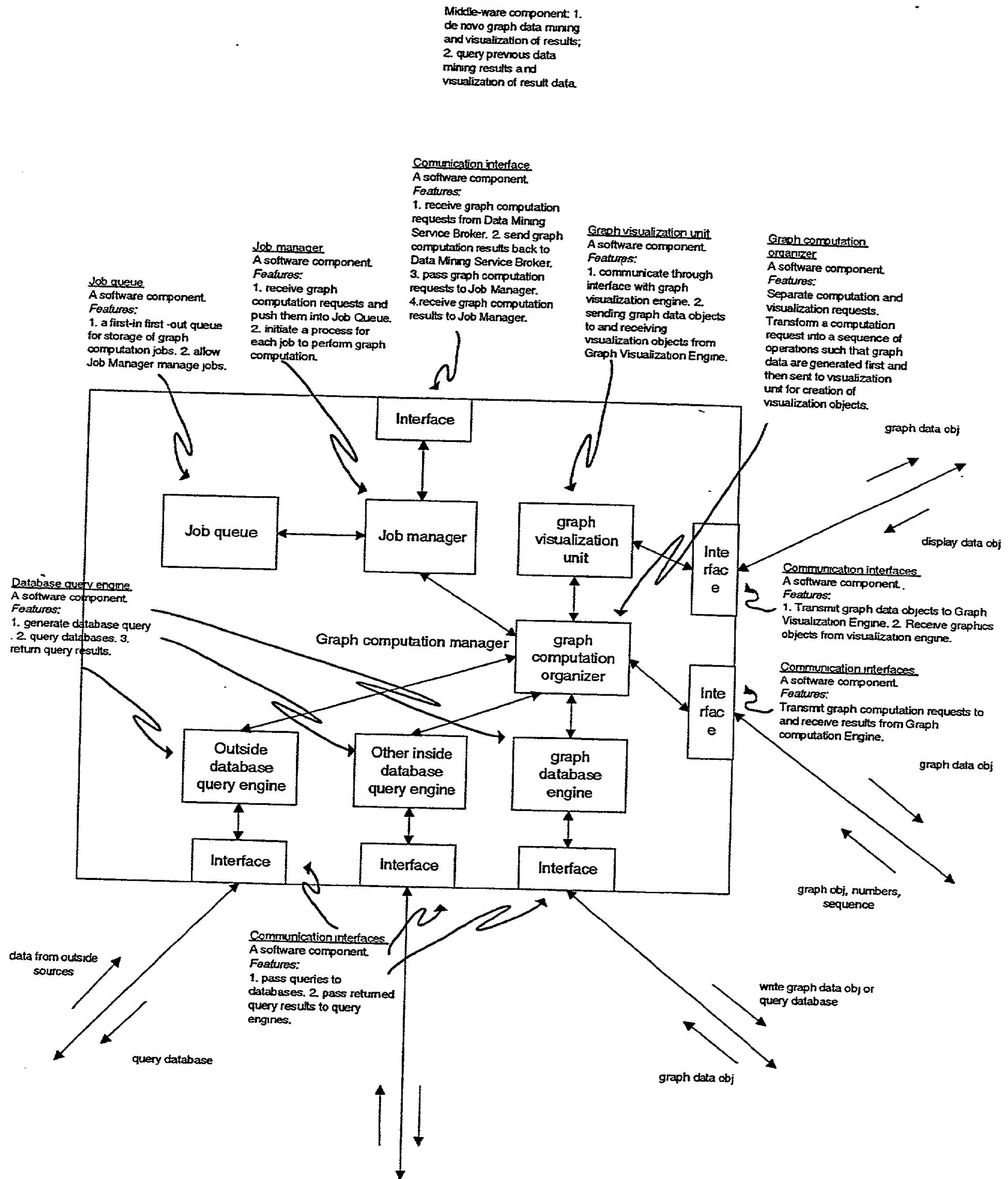


FIG. 9

Graph computation engine

Graph computation engine

A software component

Features: This is a graph computation toolkit library that provides ways to construct graphs and perform graph computations.

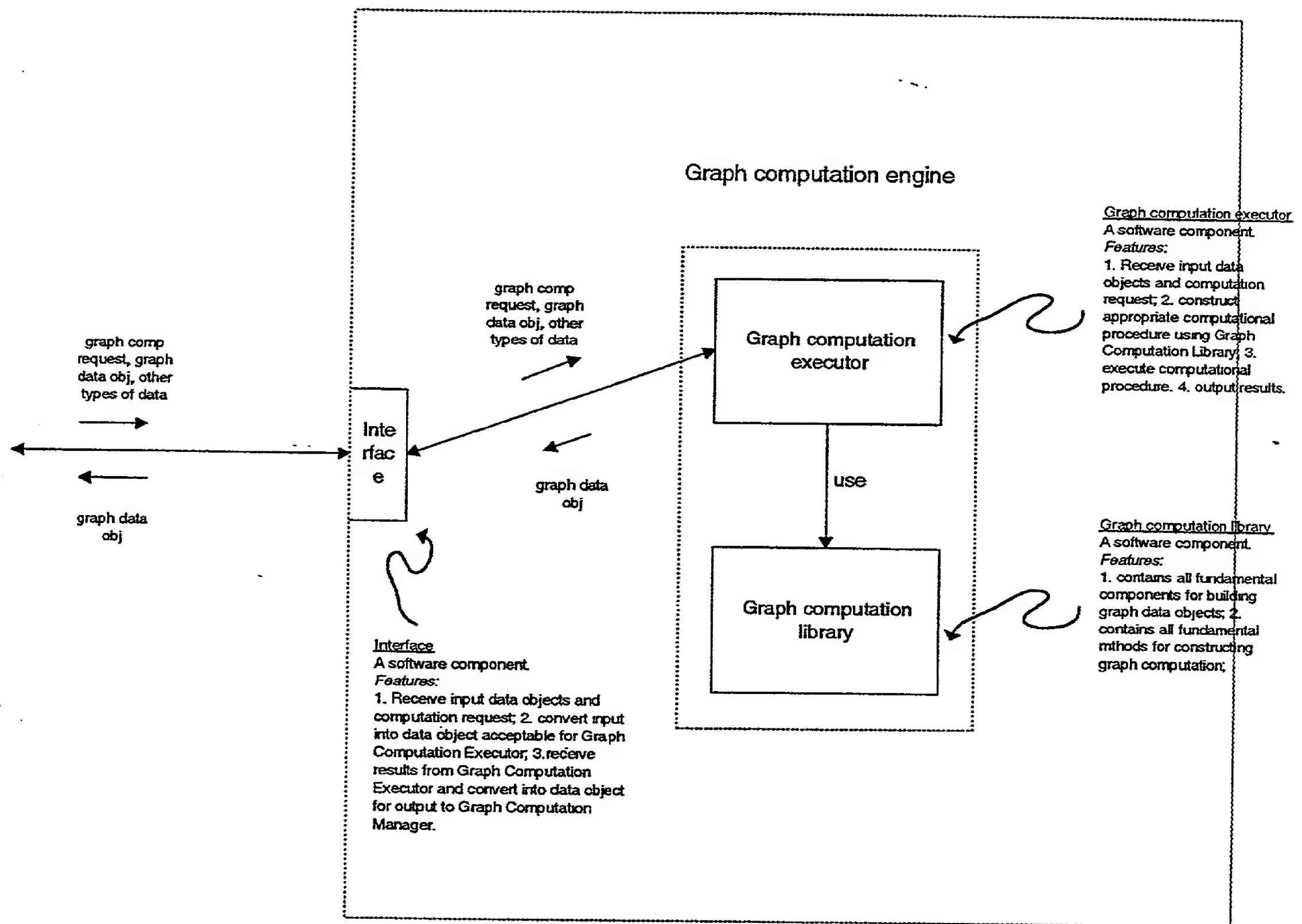
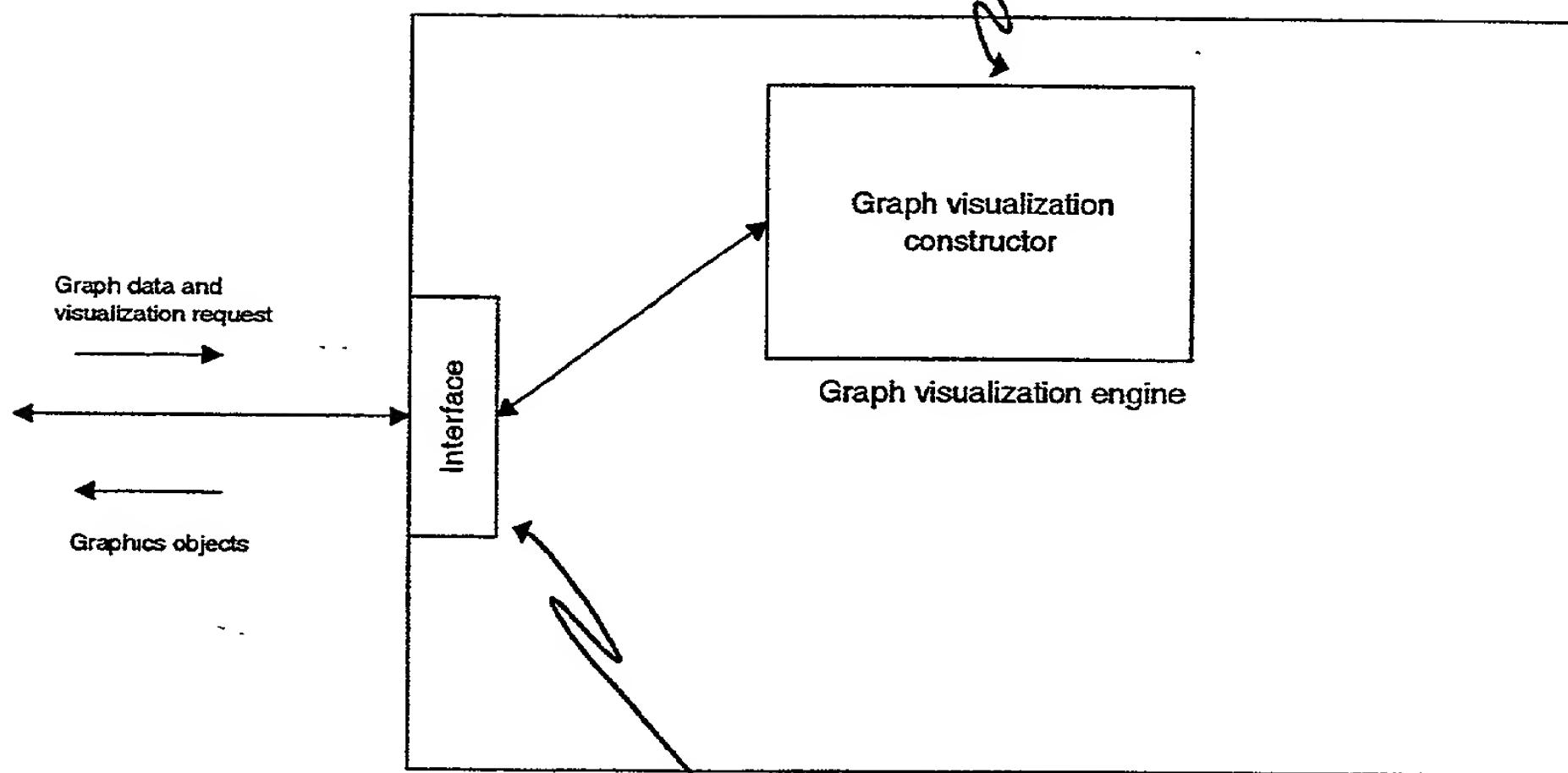


FIG. 10

Graph visualization engine

Graph visualization engine
Features:
generate graphical
visualization of graph data.

Graph visualization constructor
A software component.
Features:
construct graphics object from
graph data.
Implementation:
Tom Sawyer's GLT or GET 3.1:
create layout graphics object
from graph data.



Communication interface
A software component.
Features: delegate graph
visualization requests and
results between Graph
Computation Manager and
Graph Visualization Engine.

FIG. 11

Graph computation library

Graph computation library

A software component.

Features:

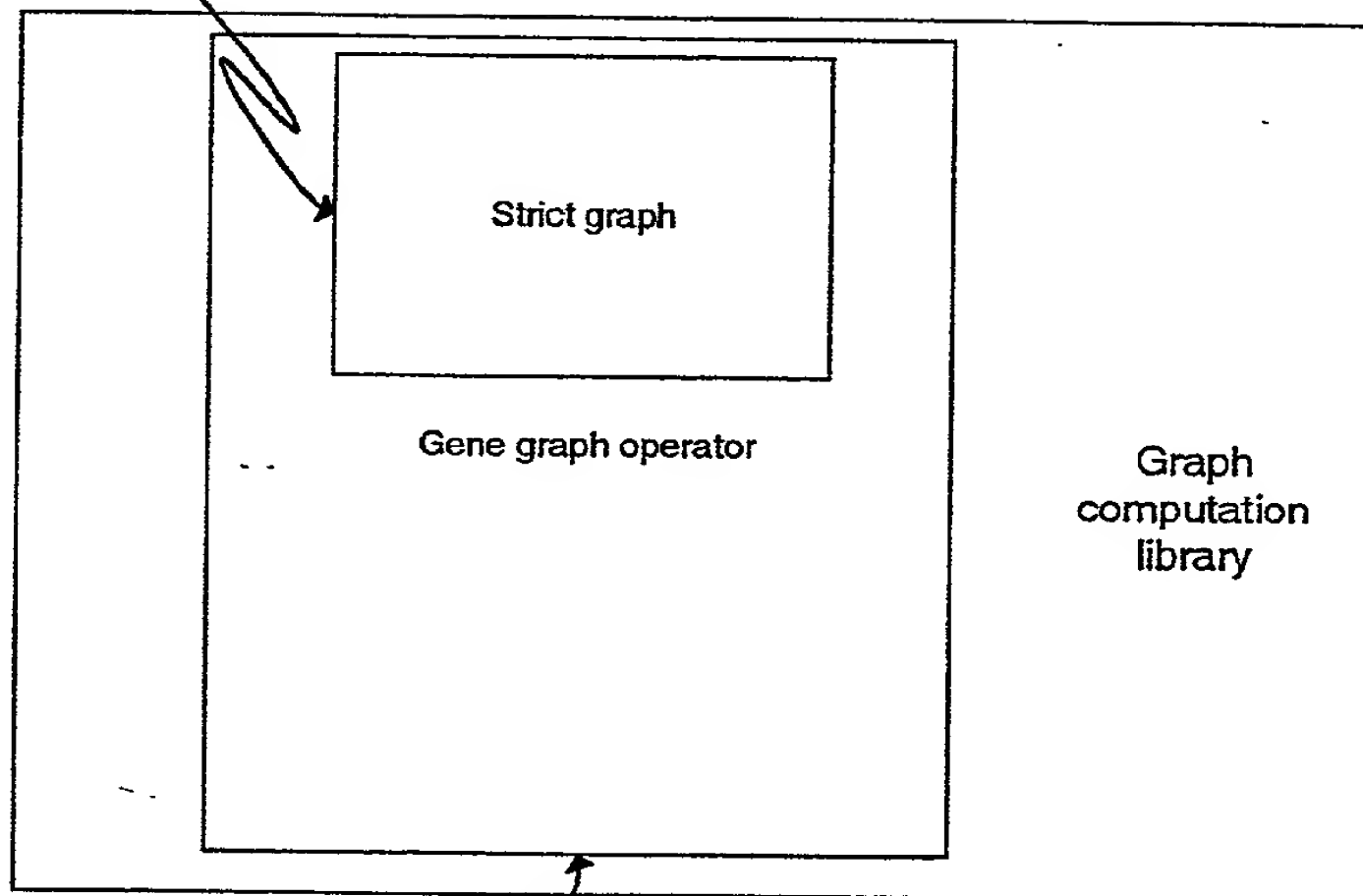
1. contains all fundamental components for building graph data objects;
2. contains all fundamental methods for constructing graph computation;
3. contains all fundamental methods for building gene graph objects.

Strict graph

A software component.

Features:

1. Provides all representations for graph data objects.
2. Provides all methods for computation of graph objects.



Gene graph operator

A software component.

- Features:
1. Provide representations for all types of gene graphs.
 2. Delegate the underlying graph representation and computation to Strict Graph component.

FIG. 12

Data interface

Data interface

A software component.

Features:

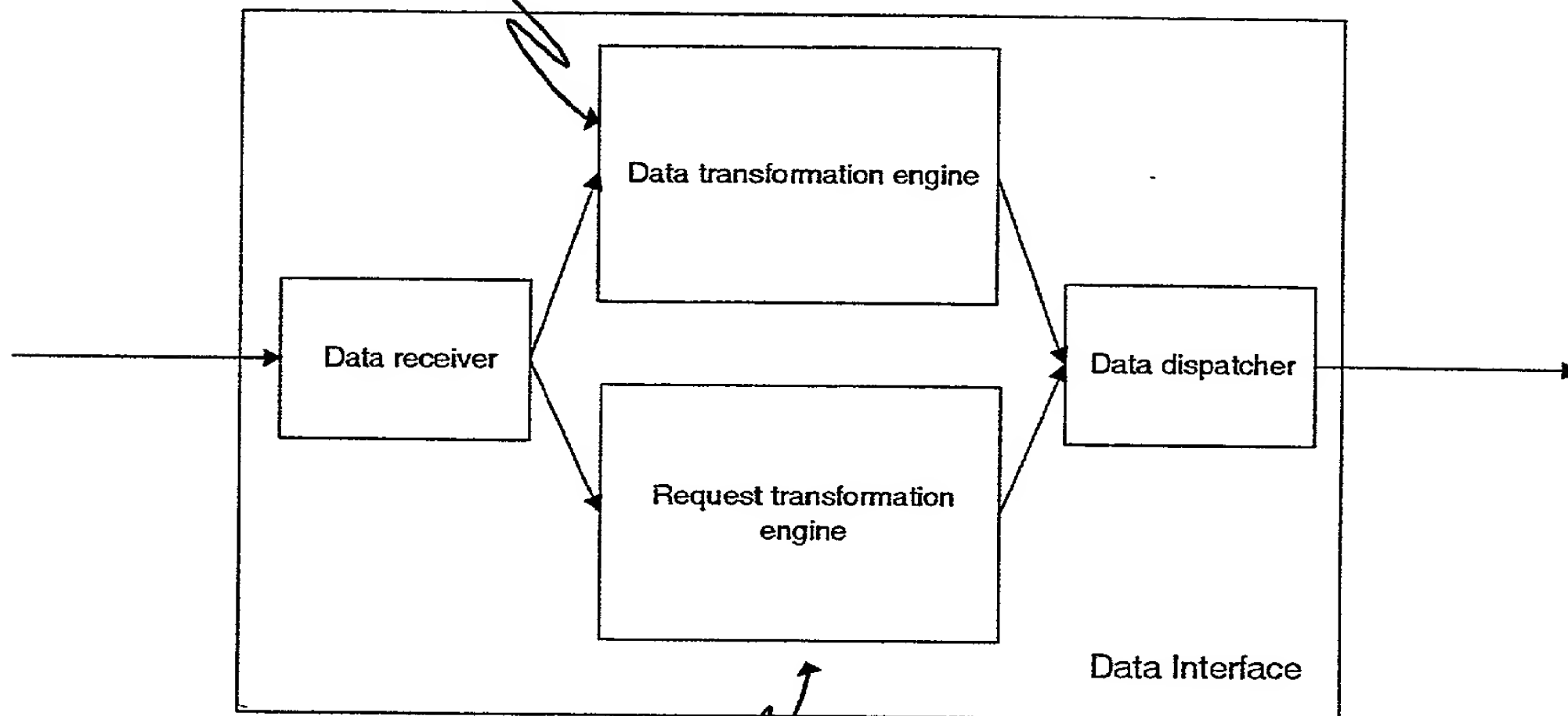
1. Receive, transform, and output computational request data objects;
2. Receive, transform, and output graph data objects.

Data transformation engine

A software component.

Features:

Transform graph data objects so that graph data can be converted from a source format into a destination format.



Request transformation engine

A software component.

Features:

Transform computational request data objects so that requests can be converted from a source format into a destination format.

FIG. 13

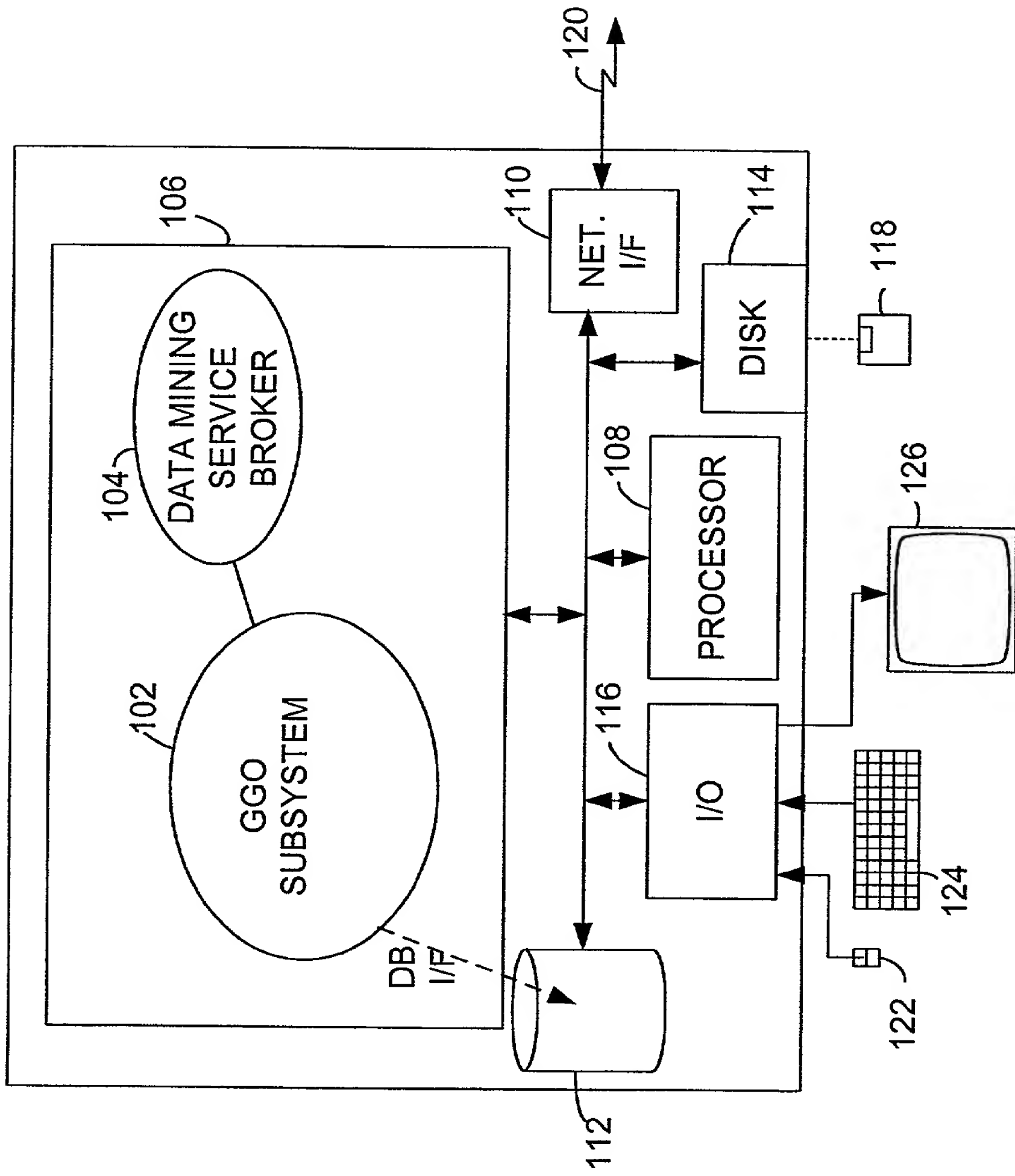


FIG. 14

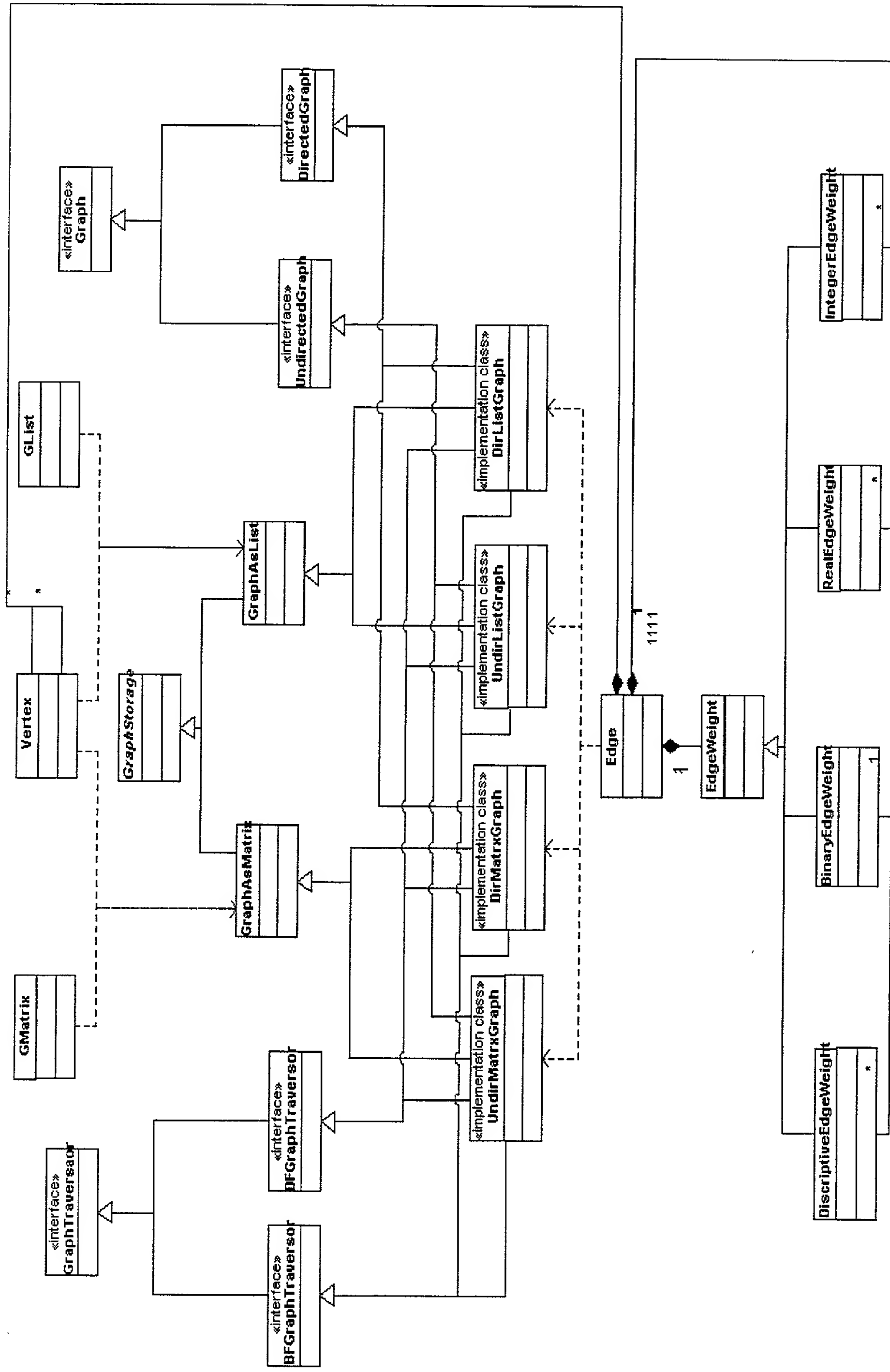


FIG. 15